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FIRST RECORDS OF SPIDERS (ARACHNIDA: ARANEI) FROM SAKHALINIAN AMBER WITH DESCRIPTION OF A NEW SPECIES OF THE GENUS *ORCHESTINA* SIMON, 1890

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Summary. *Orchestina sakhalinensis* Marusik, Perkovsky et Eskov, **sp. n.** (Oonopidae: Orchestininae) is described from Eocene of Sakhalin. Other poorly preserved specimens of spiders from Sakhalinian amber are identified to supra-family level only as Thomisiformes (=Dionycha) gen. et sp. 1 and gen. et sp. 2. Additionally the map is provided for all amber and copal deposits from where Orchestininae are known.

Key words: Araneae, Oonopidae, Orchestininae, Thomisiformes, Sakhalinian amber, taxonomy, new species, fauna, new record, Eocene, Russia.

Ю. М. Марусик, Е. Э. Перковский, К. Ю. Еськов. Первые находки пауков (Arachnida: Aranei) из сахалинского янтаря с описанием нового вида рода *Orchestina* Simon, 1890 // Дальневосточный энтомолог. 2018. N 367. С. 1-9.

Резюме. Из эоценового янтаря Сахалина описан *Orchestina sakhalinensis* Marusik, Perkovsky et Eskov, **sp. n.** (Oonopidae: Orchestininae). Остальные плохо сохранившиеся пауки из сахалинского янтаря определены как gen. et sp. 1 и gen. et sp. 2 и отнесены к группе семейств Thomisiformes (=Dionycha). Кроме того, представлена карта распространения подсемейства Orchestininae ископаемых смолах.

INTRODUCTION

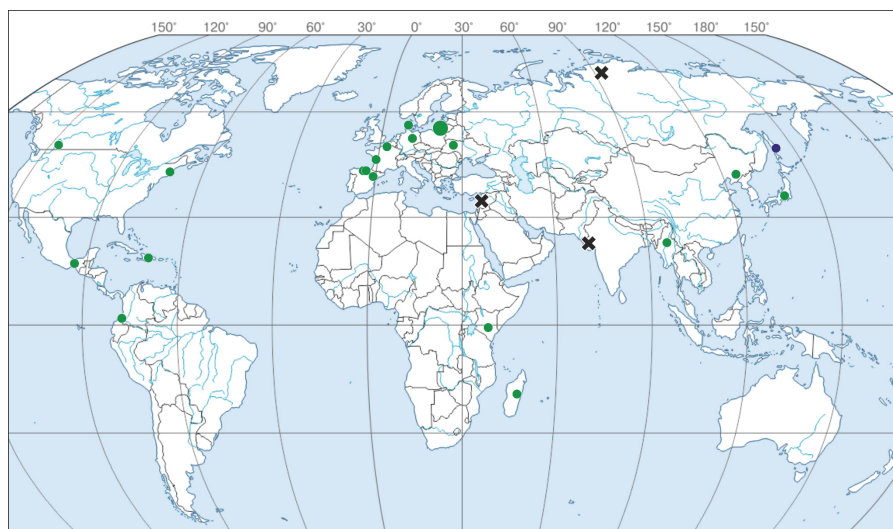
Ambers from Sakhalin, and their arthropod inclusions became known when V.V. Zherikhin and I.D. Sukatcheva collected hundreds of specimens in the Sea of Okhotsk shore near Starodubskoye Village in the southeastern part of the island in 1972. Later the source of these ambers was found nearby: coal of the Naibuchi Formation on the Naiba River (Kodrul, 1999; Baranov *et al.*, 2015; Radchenko & Perkovsky, 2016). Although insects are known in Sakhalinian amber and some groups like ants, fungus gnats, biting and non-biting midges are already surveyed (Dlussky, 1988; Szadziewski, 1990; Blagoderov, 2007; Baranov & Perkovsky, 2013; Baranov *et al.*, 2015; Radchenko & Perkovsky, 2016) the unidentified spiders reported only by Zherikhin (1978). Currently we got an opportunity to study four spider inclusions from four small pieces of Sakhalinian amber. Among them we were able to recognize only one family Oonopidae of the genus *Orchestina* Simon, 1890 and two juvenile specimens belonging to Thomisiformes (=Dionycha).

Oonopidae Simon, 1890 is large, globally distributed family with 1829 species belonging to 116 genera (WSC, 2018). Of them 42 species and two genera are known only from fossils (Dunlop *et al.*, 2018). Oonopidae together with Segestriidae are the oldest haplogyne families (Marusik & Wunderlich, 2008; Penney *et al.*, 2012). The family is known in all well studied and species rich amber (from Barremian Lebanese amber to Miocene Mexican and Dominican ambers) and copal deposits (Map 1) except Albion-Santonian Taimyr and Ypresian Cambay ambers (Petrunkovitch, 1958; Penney, 2000; Marusik & Wunderlich, 2008; Saupe *et al.*, 2012; Dunlop *et al.*, 2018).

Currently three subfamilies are recognized in Oonopidae: Oonopinae Simon, 1890, Orchestininae Chamberlin et Ivie, 1942 and Salsulinae Platnick, 2012 (Platnick *et al.*, 2012). Although Orchestininae is 10 times smaller in species number than Oonopinae, it is most species and genera rich group among fossil Oonopidae (39 species). Orchestininae currently has worldwide distribution. Although subfamily is unknown in continental Australia, one species occurs in Tasmania. Judging from the structure of the male palp (presence of the sperm duct) it is most plesiomorphic group of Oonopidae. Orchestininae for long time was known by one genus, until Saaristo &

Marusik (2004) described *Ferchestina* from the Russian Far East. Marusik & Wunderlich (2008) split all fossil species into four non monotypic groups, and seven monotypic species groups. Later Wunderlich (2008) described two Cretaceous genera and two Eocene subgenera for fossil *Orchestina*: *Burmorchestina*, *Canadaorchestina*, *Orchestina* (*Gallorchestina*) and *Orchestina* (*Baltorchestina*). While delimiting subfamilies Platnick *et al.* (2012) mentioned only one genus in the Orchestiniinae, *Orchestina*. All fossil genera have been ignored.

Goals of this paper are to provide description of a new species of *Orchestina* and prepare brief comments on other specimens found in Sakhalinian amber.



Map 1. Fossil resin localities (both amber and copal) where Orchestiniinae are known (dots) and large deposits where Orchestiniinae (x) are not documented (see text). Large dot refers to the richest Late Eocene Baltic amber; blue dot shows Middle Eocene Sakhalinian amber deposit.

MATERIAL AND METHODS

Sakhalinian amber has Middle Eocene age (Kodrul, 1999); alternative age estimation and their reasons discussed in Baranov *et al.* (2015) and Radchenko & Perkovsky (2016). It belongs to the rumanite-type amber (Rasnitsyn & Quicke, 2002). Common for such fossil resins is a high degree of polymerization of the resin itself and deformation caused by thermal metamorphosis during the diagenesis. Insect inclusions in rumanite-type (particularly Sakhalinian) amber are therefore often deformed and have their internal cavity filled with resin (Rasnitsyn & Quicke, 2002). All spider inclusions from Sakhalinian amber are deformed.

Photographs of specimens were taken with a Canon EOS 7D camera attached to an Olympus SZX16 stereomicroscope at the Zoological Museum, University of Turku, Finland. Digital images were prepared using CombineZP image stacking software.

Leg measurements are given as: total length (femur, patella+tibia, metatarsus, tarsus). All specimens examined here are deposited in the Palaeontological Institute, Russian Academy of Sciences, Moscow (PIN).

DESCRIPTION OF NEW SPECIES

***Orchestina sakhalinensis* Marusik, Perkovsky et Eskov, sp. n.**

Figs 1–9

TYPE MATERIAL. Holotype ♂ (PIN 3387/731) and paratype ♀ (PIN 3387/732), **Russia**: Starodubskoye, Sakhalinian amber, Middle Eocene. Well-preserved inclusion in clear yellow amber; syninclusions absent; both are deposited in PIN.

DIAGNOSIS. The new species resembles *Orchestina imperialis* Petrunkevitch, 1963 (*cf.* fig. 19 in Marusik & Wunderlich, 2008), a species known from Baltic amber. Two species have moderately swollen palpal tibia (not strongly as in many other species), relatively large cymbium and elongate patella. The new species differs by embolus bent anteriorly (*vs.* posteriorly), and not modified (swollen) palpal femur *vs.* thick femur. Two species differ also by length of embolus shorter in *O. sakhalinensis* sp. n. (long and thin, stylus or whip like in *O. imperialis*), but it can be caused of deformation of embolus and actually broken tip in the new species.

DESCRIPTION. Male (holotype, Figs 1–2, 6–9). Body 0.93 mm long. Carapace 0.36 mm long, 0.26 mm wide; slightly deformed; eyes not properly visible. Leg length: I 1.27 (0.39, 0.36, 0.31, 0.21), II 1.13 (0.4, 0.31, 0.23, 0.19). Femur IV 0.1 mm thick. Carapace, abdomen and legs covered with long setae.

Palp as in Figs 1–2, 8–9; femur almost 2 times longer than patella; patella 1.5 shorter than tibia; tibia swollen, almost t time longer than wide cymbium slightly shorter than tibia; bulb massive; tegular part wider than patella, 2 times wider than long; psempolus long, as long as tegulum wide, tip of psempolus broken in both palps and real length of psempolus unknown as well as conformation of the tip, that can be stylus like or bifurcated.

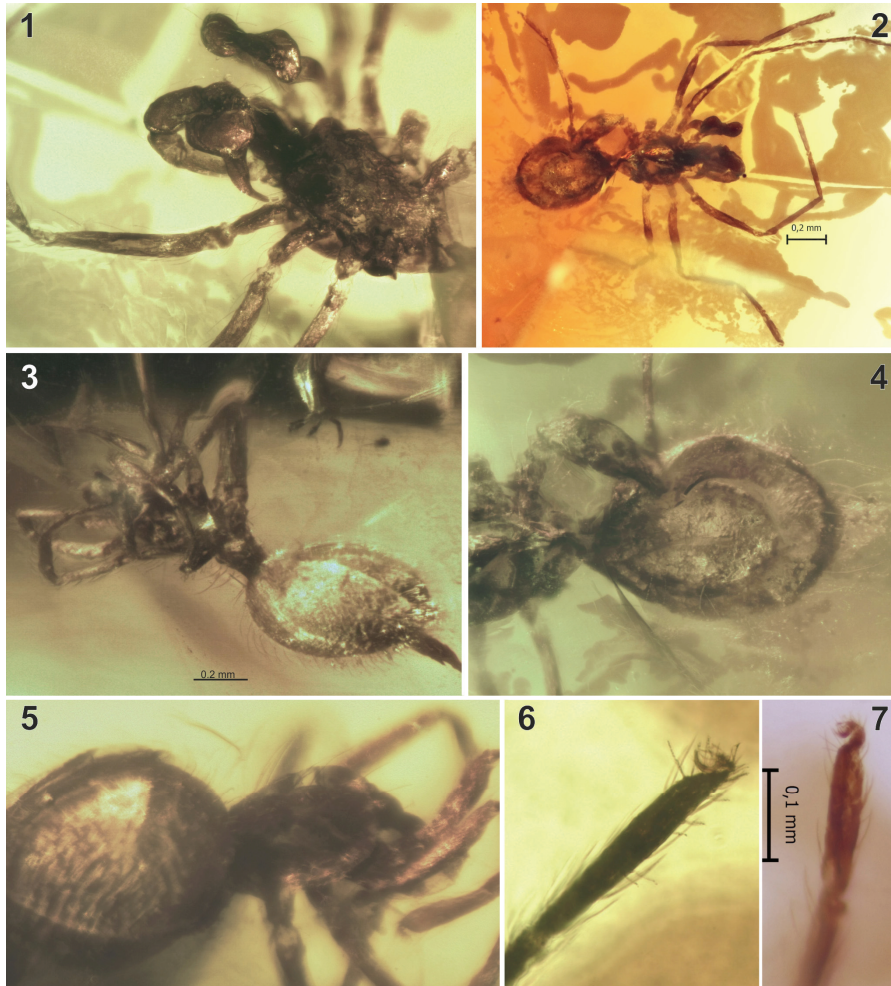
Female (paratype, Figs 3–5). Total length *ca.* 0.92 mm. Carapace 0.33 mm long. Abdomen, carapace and legs covered with long hairs. Fe I–III *ca.* 0.29 mm, patella+tibia I 0.23 mm, metatarsus and tarsus I *ca.* 0.17 mm. Tarsi I and II gradually widening toward the top, possibly due to the deformation. Femur IV not so wide as in male.

NOTES. The female considered as conspecific with the male because it has almost the same size and body covered with long hairs. At the same time, it has shorter legs with widened tarsi I and II, as well as no so strongly swollen femur IV.

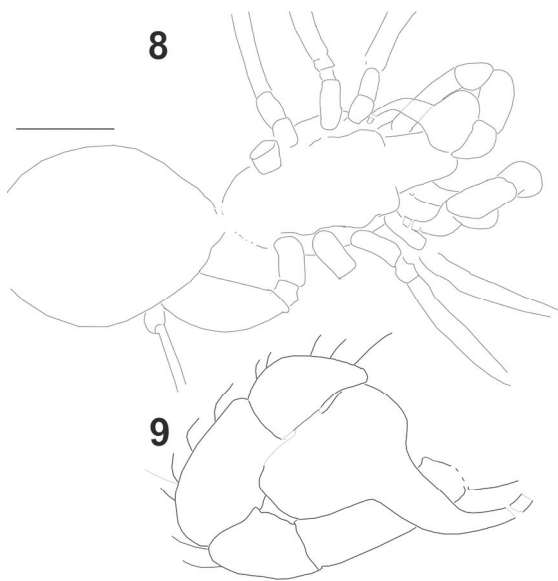
Shape of the male palp does not fit to any of recognized species groups in fossil *Orchestina* (*sensu lato*). Unlike in all other Orchestininae embolic part of the bulb (psempolus *sensu* Saaristo, 2006) is bent anteriorly ("upward"), but not posteriorly ("downward"). Shape of the palp of new species does not resemble any extant species. With some extent palp is little bit similar to these in *O. chaparrita* Izquierdo, 2017 (Mexico) and *O. laselva* Izquierdo, 2017 (Costa Rica & Ecuador) (see Izquierdo & Ramírez, 2017: figs 42a–b, g–h). These species have relatively small and not strongly

swollen palpal tibia, long femur, large tegular part (wider than long), and elongate and almost straight psemboles with slightly bent tip in *O. laselva*. Both species have modified tip with lamellar structures unrecognizable in *O. sakhalinensis* sp. n. due to deformed terminal part of psemboles.

ETYMOLOGY. The species name derived from the Sakhalin Island.



Figs 1–7. *Orchestina sakhalinensis* sp. n.: holotype male (1–2, 6–7) and paratype female (3–5). 1 – prosoma ventral; 2 – habitus, dorsal; 3 – habitus, ventral; 4 – abdomen, dorsal; 5 – habitus, lateral; 6–7 – tarsi I and II showing onychium.



Figs 8–9. Line drawings of the holotype male of *Orchestina sakhalinensis* sp. n. 8 – habitus, dorsal; 9 – palp.

NEW RECORDS

The group Thomisiformes Simon, 1864

This group is also known as *Dionycha* Petrunkevitch, 1928. It consists of 16–17 families of araneomorph spiders with 2 claws and one tracheal spiracle (Ramírez, 2014). Here we are using senior synonym *Thomisiformes* because it is typified named (based in *Thomisidae*) unlike *Dionycha*, which is non-typified name (Marusik, 2018); although priority rule does not affect name of taxa higher than family-group names.

Two specimens found in Sakhalinian amber are juveniles, their bodies are strongly deformed. Lack of male palps does not allow us to place these two specimens to any family of *Thomisiformes*.

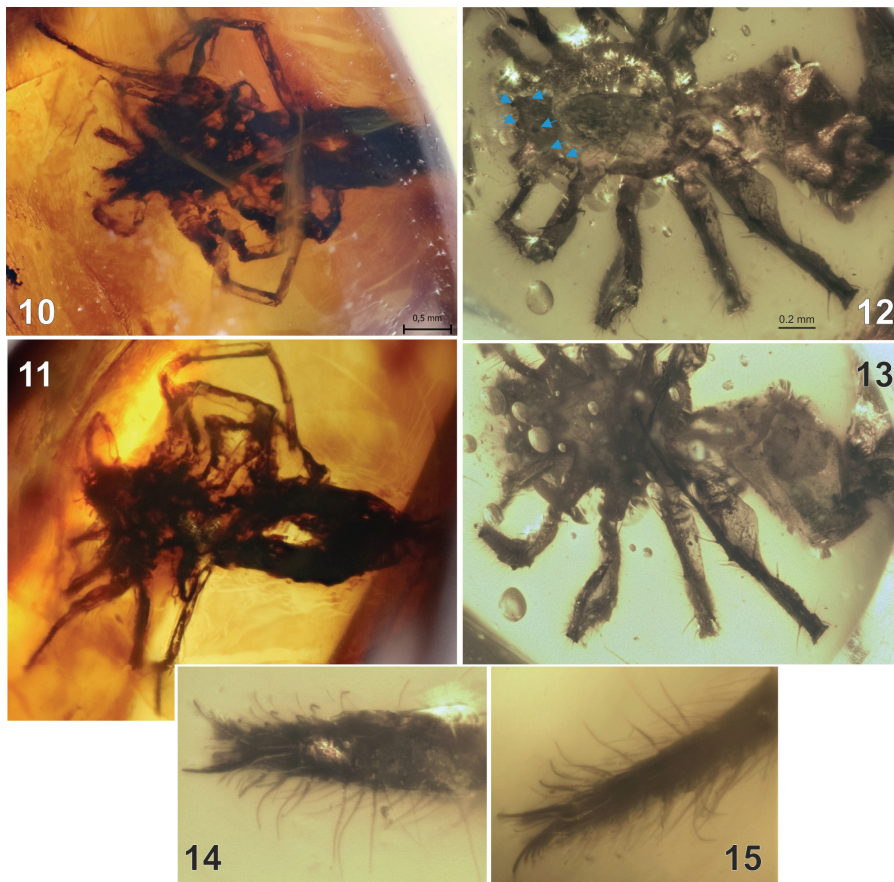
Gen. et sp. 1

Figs 12–15

MATERIAL. 1 juvenile specimen PIN 3387/634 in Middle Eocene Sakhalinian amber without syninclusions.

NOTES. It is possibly a subadult female, about 2 mm long, with almost undeformed carapace, but deformed abdomen. It has seems 8 eyes (possible position of eyes arrowed on Fig. 12), lateral eyes relative large. Cribellum and calamistrum are lacking. Specimens has rather long and dense setae on tarsi (Figs 14–15); legs with

strong spines, but lacking series of long ventral spines on tibia and metatarsi I and II characteristic for Liocraniidae, Corinnidae or Phrurolithidae. Tarsi are uniseriate.



Figs 10–15. Unidentified to family two juvenile specimens of Thomisiformes: PIN 3387/559 (10–11) and PIN 3387/634 (12–15). 10, 12 – habitus, dorsal; 11, 13 – habitus, ventral; 14–15 – tarsi, showing long hairs and uniseriate claws. Arrows on fig. 12 indicates possible position of the eyes.

Gen. et sp. 2

Figs 10–11

MATERIAL. 1 juvenile specimen PIN 3387/559 in Sakhalinian amber, piece without syninclusions.

NOTES. Body strongly deformed. Total length about 3 mm. Cribellum and calamistrum are lacking.

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